COMMUNICATION SYSTEM USING WIRELESS POWER

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application is a continuation of U.S. patent application Ser. No. 13/597,780 filed on Aug. 29, 2012, which claims the benefit under 35 U.S.C. §119(a) of Korean Patent Application No. 10-2011-0088797, filed on Sep. 2, 2011, in the Korean Intellectual Property Office, the entire disclosure of which is incorporated herein by reference for all purposes.

BACKGROUND

[0002] 1. Field

[0003] The following description relates to performing communications using wireless power.

[0004] 2. Description of Related Art

[0005] Research into wireless power transmission has been conducted to address the limited capacity of conventional batteries, and the inconvenience of wired power for portable devices, and the like. The research is mainly focused on near-field wireless power transmission. Near-field wireless power transmission refers to a case in which a distance between transmission and reception coils is sufficiently short when compared to a wavelength at an operating frequency. One conventional wireless power transmission and reception system uses a resonance characteristic and may include a source for providing power and a target for receiving power. In a process of transmitting and receiving wireless power, the source and the target may share control information.

SUMMARY

[0006] According to one general aspect, a communication device using wireless power may include: a controller configured to control mutual resonance between a target resonator and a source resonator; a demodulator configured to demodulate information transmitted from the source resonator based on an amount of energy received from the source resonator; and a modulator configured to modulate information based on the mutual resonance.

[0007] The controller may control a time interval for the mutual resonance between the target resonator and the source resonator.

[0008] The controller may control a time interval for storing energy in the target resonator through the mutual resonance and a time interval for capturing the energy stored in the target resonator.

[0009] The modulator may modulate the information based on the time interval for mutual resonance.

[0010] The controller may control the target resonator so that the target resonator receives energy, transmitted from the source resonator, through mutual resonance for one or more symbol duration times, and determine whether at least one target resonator, other than the target resonator, mutually resonates with the source resonator.

[0011] The modulator may modulate the information based on whether the at least one target resonator and the source resonator mutually resonate.

[0012] The communication device may further include: an energy adjuster configured to adjust an amount of energy expended in the target resonator, wherein the controller controls a resonant frequency of the target resonator so that the target resonator and the source resonator mutually resonate.

[0013] The energy adjuster may adjust, using an active element or a passive element, the amount of energy expended in the target resonator so that a Quality (Q) factor of the target resonator has a quantized value.

[0014] The modulator may modulate the information based on the amount of energy expended.

[0015] The communication device may further include: a receiver configured to receive energy transmitted from the source resonator through mutual resonance between the target resonator and the source resonator.

[0016] The controller may control an electrical connection between the target resonator and a load to which the received energy is delivered.

[0017] According to another general aspect, a communication device using wireless power may include: a modulator configured to modulate information based on an amount of energy stored in a source resonator; a demodulator configured to demodulate information transmitted from a target resonator based on a variation of a waveform of energy stored in the source resonator through mutual resonance between the source resonator and the target resonator; and a controller configured to control an amount of energy delivered to the source resonator from a power supply device.

[0018] The demodulator may demodulate the information transmitted from the target resonator based on a point in time at which the waveform of the energy varies within a symbol duration time.

[0019] The demodulator may demodulate the information transmitted from the target resonator based on the magnitude of the energy within a symbol duration time.

[0020] The demodulator may determine whether a mutual resonance occurs between the source resonator and the target resonator based on the waveform of the energy within a symbol duration time, and demodulate information transmitted from the target resonator based on whether the mutual resonance occurs.

[0021] The controller may control an electrical connection between the power supply device and the source resonator.

[0022] The communication device may further include: a transmitter configured to transmit the energy stored in the source resonator through the mutual resonance.

[0023] The communication device may further include: an energy adjuster configured to adjust an amount of energy expended in the source resonator.

[0024] The energy adjuster may adjust the amount of energy expended in the source resonator using an active element or a passive element.

[0025] According to yet another general aspect, a communication system using wireless power may include: a first modulator configured to modulate information based on an amount of energy stored in a source resonator; a first demodulator configured to demodulate information transmitted from a target resonator based on a variation of a waveform of the energy stored in the source resonator through a mutual resonance between the source resonator and the target resonator; a first controller configured to control an amount of energy delivered to the source resonator from a power supply device; a second controller configured to control mutual resonance between the target resonator and the source resonator; a second demodulator